The author expresses his hope to lay before the Society a continuation, containing some original mathematical investigations on magnetic distributions, and a theory of induction, in ferromagnetic or diamagnetic substances.

8. "On the Nitroprussides, a new Class of Salts." By Dr. Lyon Playfair, F.R.S., F.C.S.

When nitric acid is made to act on yellow prusside of potassium, in the proportion of one equivalent of acid for every equivalent of potassium present in the salt, the following reactions are observed. The salt dissolves in the acid with a dark red, almost black colour, a very little nitric oxide is evolved, which soon ceases, and is followed by a copious evolution of cyanogen mixed with nitrogen. The continued action of the acid causes the liquid to cease the usual reactions of red prusside of potassium; the addition of sulphate of iron now produces a slate-coloured instead of blue precipitate. On allowing the solution to cool, abundance of nitrate of potash crystallizes out, mixed with a little prussian blue, and about 5 per cent. of the original weight of the salt, of a white granular substance, which is scarcely soluble in cold, and only very slightly so in boiling water. This white substance, on examination, proves to be the remarkable body *oxamide*, the production of which in an oxidising medium is highly singular.

The dark red supernatant liquor, being neutralized with an alkaline carbonate, and boiled, deposits a green precipitate and yields a clear ruby-red solution. This solution furnishes the new class of salts, which is the subject of this paper. It may be evaporated to crystallization, and yields the nitroprusside of the base used in the neutralization.

The characters of the nitroprussides thus obtained are very marked, and cannot be confounded with those of any known class of salts.

With soluble sulphurets, the nitroprussides produce the most magnificent purple-coloured solution, and of such intensity, that they form by far the best test for the presence of a sulphuret, and betray its presence when the usual tests for a sulphuret are insufficient to expose it.

With a protosulphate of iron, the nitroprussides produce a salmon-coloured precipitate; with salts of silver, zinc and cobalt, a precipitate of a flesh colour; and with nickel, a dirty white precipitate. With a salt of copper, the precipitate is of a light green, and with salts of lead, no precipitate is occasioned.

Nitroprussic acid is obtained by adding muriatic acid to the silver salt, and forms a dark red solution, which yields on evaporation *in vacuo*, large and well-defined crystals.

The nitroprussides of sodium, potassium, ammonium, barium and calcium, are all soluble and crystallize readily, forming fine large red crystals, which have been measured by Prof. Miller of Cambridge, and are described in the paper. The salts of barium and calcium decompose on evaporation, and can after that no longer be

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obtained perfectly pure, having dissolved about one per cent. of the products of decomposition, which are not removed by subsequent crystallization.

Potash and soda in the cold unite with the nitroprussides, and form distinct salts, in which there is one equivalent of these alkalies for every equivalent of the baryle. These alkalies when heated with the nitroprussides decompose them altogether, forming peroxide of iron, hyponitrites, oxalic acid and ordinary ferrocyanides.

Sulphuretted hydrogen and soluble sulphurets also decompose the nitroprussides.

The formula of the nitroprussides is remarkably complex. Well-accordant analyses of all the salts permit no simpler relation between their carbon and iron than 24 equivs. of the former to 5 equivs. of the latter. The simpler proportion of 25 to 5 or 5 to 1, cannot be drawn legitimately from their composition. Analysis, and also a study of their transformation, show that they contain nitrous oxide, and have led to the complex formula

$$Fe_5Cy_{12}3NO+5R.$$

This is obviously a conjugate formula, and allows itself to be divided, for reasons now to be given, into the more simple expression

$$2(Fe_2Cy_5NO+2R)+(FeCy_2NO+R).$$

The relation of nitroprussides to ordinary prussides is supposed to be as follows:—

Both the ferrocyanides and the ferridcyanides are supposed to contain a common radical, one being quadribasic and the other tribasic, just as in the case of the modifications of phosphoric acid. A bibasic modification is therefore to be looked for. The formulæ would be as follows:

Ferrocyanides	$(Fe_2Cy_6)+4R.$
Ferridcyanides.....	$(Fe_2Cy_6)+3R.$
Hypothetical compound ..	$(Fe_2Cy_6)+2R.$

The nitroprussides are supposed to correspond to the last of the series, in which one equivalent of cyanogen is replaced by one equiv. of nitrous oxide. In the case of the beautiful purple compound produced by the soluble sulphurets on nitroprussides, this nitrous oxide is replaced by sulphuret of nitrogen. The hypothetical bibasic prusside necessary to establish this view has not yet been obtained; but the author states that experiments made with this view have already been so successful, that he shortly expects to announce it to the Society.

9. "On the Structure of the Dental Tissues of Marsupial Animals, and more especially of the Enamel." By John Tomes, Esq. Communicated by Dr. Grant, F.R.S.

The author of this communication, after examining microscopically the teeth of many marsupial animals taken from the majority of the families that make up the order Marsupialia, finds that they possess a structural character by which they may be distinguished from other